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BURGH OF MOTHERWELL AND WISHAW

ANNUAL REPORT

OF THE

SEWAGE WORKS MANAGER

FOR THE

Year ended December 31st, 1957

DONALD H. BARRACLOUGH,
F.I.P.H.E., M.Inst.S.P., M.R.S.H.

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MEMBERS OF THE STREETS AND DRAINAGE COMMITTEE - 1957

January to May	May to December
Councillor T. Train (Convener)	Bailie T. Stewart (Convener)
Councillor J. Johnston 2 (Vice-Convener)	Councillor A.S. Banks (Vice-Convener)
Provost B. Brogan (Ex-officio)	Provost B. Brogan (Ex-officio)
Bailie H. Kerr	Bailie D.W. Bill
Bailie J. Tulloch	Bailie J. Haig
Police Judge D. Cross	Bailie J. Johnston (2)
Councillor C. Donnelly	Hon. Treasurer K. Weir
Councillor D. Martin	Councillor C. Donnelly
Councillor T. Stewart	Councillor A.D. Mowatt
Councillor T. Wilson	Councillor T. Wilson

Sewage Works Department,
Clyde Park Sewage Works,
Motherwell.

June, 1958.

Mr. Convener and Gentlemen,

I have the honour to present my annual report for the year ended December 31st, 1957.

Because of the topography of the area and the historical development of the sewerage and sewage purification services within the Burgh, there are three sewage purification works to be maintained and operated by the Sewage Works Department of the Town Council. The Sewage Works are located at Lower Carbarns, Wishaw; Clyde Park, Motherwell; and at Jerviston Street, Motherwell.

The Sewerage of the town is on the combined system and there is a high water consumption for domestic as well as industrial purposes, a factor which, when combined with the considerable infiltration to the sewer results in a high volume of sewage of a weak character.

Flows to the Coursington Works are not metered, and at the Clyde Park and Carbarns Works only the quantity passing for full treatment is recorded.

An outline of the past years working and the results obtained is given on the following pages.

Rainfall

The total rainfall registered at the Clyde Park Works was 33.61 inches, compared with 31.49 inches during the previous year, an increase of 2.12 inches. January had the highest monthly rainfall with 4.82 inches, and November had the lowest fall with 1.33 inches.

It is not possible at present to meter the flow at the Coursington Works, the flow being estimated at a figure of one million gallons per day, and the estimated total flow which was given full treatment at the Town Council's three Sewage Works was 2,424 million gallons, an increase of 252 million gallons on the previous year, and an average of 6.64 million gallons per day.

Carbarns Works

Estimated population served - 32,990
Total volume given full treatment - 1,173.437 million gallons
Daily average - 3.215 million gallons

The sewage from the Wishaw and Craigneuk areas of the Burgh is treated at the Carbarns Works, which was designed to deal with a daily dry weather flow of two million gallons and which was put into commission in 1934. There is continuous development in the area served by this Works and the overload now exceeds

30%, never-the-less the final effluent was of satisfactory quality for most of the year, but there were a few occasions when trubidity and dispersed activated sludge solids caused slightly sub-standard effluents, a feature which will be eliminated when additional settlement capacity can be provided.

The foaming caused by the synthetic detergents has not been excessive during the year although there were occasions when some nuisance occurred.

On January 8th 1957 the transfer of the digesting sludge from the old digester to the new digester was completed, and on the following day the gas was used for power production. The new digester was thus started with actively digesting sludge and although the temperature was rather low it was anticipated that little or no trouble would be experienced, but on January 29th 1957 severe foaming began and the foam spilled from the digester continuously. Although defoamants were used externally to reduce the nuisance, no artificial means were applied to the digesting sludge, the foaming being allowed to run its natural course. Eventually there was a drop in gas production, foaming ceased, and no further troubles of this nature were experienced.

On starting up the new digester for use as a primary heated tank, a start was made to thoroughly clean out the old digester in preparation for its future use as an unheated secondary stage, and on the 18th of March, 1957, this tank was entered for the first time since it was put into service in June 1934, almost 23 years ago. A residual layer of thick scum and accumulated grit was removed from the floor with considerable difficulty, but the condition of the mechanical stirring equipment was remarkably good and on being hosed down the original red paint was still visible on some of the steel work. The heating coils around the side of the tank were covered with scale of a thickness varying from 1/16" to ⅛" on the under surface, to ⅛" to ¼" on the upper surface, a scale which was easily chipped off to show a pipe in good condition. The tank was put back into service on the 11th April, 1957.

The new sludge drying beds which were first put into service in December, 1956, have continued to give satisfactory results. The use of waste aluminium chloride solution to aid dewatering was continued, but although rapid dewatering can be achieved by its use the final drying of the sludge depends on atmospheric conditions and, under the prolonged wet weather conditions which obtained toward the end of the year it again became necessary to use the lagoons for surplus sludge.

Gas produced during the digestion of the sludge was 1.6 million cubic feet more than in the preceeding year but this was still below the figure for 1955. It is worth recording here that a daily record for gas production occurred on February 8th 1957, when 47,670 cubic feet were produced.

Clyde Park Works

Estimated population served - 22,000
Total volume given full treatment - 885.550 million gallons
Daily average - 2.426 million gallons

The Clyde Park Sewage Purification Works serves the area of Motherwell which drains to the River Clyde, and was designed to deal with the daily dry weather flow of 1.5 million gallons, and is at present working satisfactorily at its designed capacity.

The foaming caused by synthetic detergents increased slightly in the early spring and control by the use of chemical defoamants was put into operation when necessary. Increased foaming occurred on units where the diffuser trays had been reconditioned.

During the year tests were made on working the activated sludge plant with a reduced detention period but with the same air supply. It was found that an effluent within the Royal Commission Standard could be produced with only fifty per cent of the aeration capacity in use. On reducing the capacity to one third of the normal there was an obvious deterioration in the condition of the activated sludge.

Sludge digestion continued satisfactorily and the total gas production showed an increase of just over 228,000 cubic feet on the previous year, but which was lower than the high yield of 1955, a very dry year. The total volume of sludge produced continues to increase and only because of the use of waste aluminium chloride solution to assist dewatering the sludge was it possible to deal with the total sludge production. A record of the number of drying beds filled was commenced during the previous year and a comparison shows that the number of beds filled during the year under review was 35% more than in the previous year. This of course involved additional labour in clearing the beds.

Coursington Works

Estimated average flow is 1 million gallons per day.
Estimated population served - 10,200

The Coursington Works serves that area of Motherwell which drains naturally to the South Calder Water, and it is the oldest of the Town Council's Sewage Works, being put into service in 1906. The plant is considerably overloaded and is in poor condition. The presence of crude gas liquor in the sewage makes it impossible to produce an effluent even approaching the Royal Commission Standard. The provision of a modern plant is still under consideration and held up by restrictions on capital expenditure.

The practice of removing sludge from this works by tanker waggon has continued, all primary sludge being removed in this way. Some secondary sludge was dried out on site in order to enable both secondary tanks to be thoroughly cleaned. Plant and desludging operations were improved by repairs to the dividing wall between the two secondary settling tanks.

The use of gammahexane for the control of filter flies was continued, and on one occasion D.D.T. powder was used on the filter walls. Towards the end of the summer there was an increase in the number of psychoda flies and there appeared to be a decrease in the "anisopus" fly population in the filters.

Laboratory

The work in the laboratory was continued to provide the necessary information for plant operation and trade effluent control, the total number of samples received being 1042 and on these a total of 6327 separate estimations were made. The analysis of samples taken for the purpose of determining the extent of atmospheric pollution was continued, the samples being brought in from the five stations at monthly intervals. Ninety four samples were received from this source and on these 479 separate estimations were carried out.

Trade Effluents

Surveillance of trade effluents continued, the total number of visits made to trade premises being 185, a decrease of eight on the previous year. The total number of samples of trade effluent taken during the year was 360, and of the samples of trade effluent passing to the sewers 18 were found to be unsatisfactory. In addition, on two occasions a series of samples was taken at 15 minute intervals on the drain from a particular factory, a total 35 samples being taken of which 13 were unsatisfactory because of the presence of mineral acid.

The following is a summary of the samples of trade effluent which were unsatisfactory:-

Presence of mineral acid	-	15
Low pH value	-	2
Presence of cyanide	-	1

Staff

There were no changes in the establishment or personnel during the year, Assistant Chemist W. Templeton being away on national service and Mr. C. Cunningham carrying out the duties in a temporary capacity.

The Clyde River Purification Board

The River Purification Authority for the Motherwell and Wishaw area is the Clyde River Purification Board which commenced to exercise its functions on October 1st, 1956. The River Inspectors did not visit the works of the Town Council during the year 1957.

General

In addition to the work done on the Sewage Treatment Works, engineering maintenance was carried out at the Motherwell and Wishaw Slaughter Houses, also at Avon Lodge Home and at the Sewage Pumping Station serving the Avon Lodge Home.

The number of visitors to the Town Council's Sewage Works was lower than in the previous year but the works still continue to be of interest to people from all parts of the country.

In conclusion I wish to express my appreciation of the support given to me by the Convener and Members of the Streets and Drainage Committee, and also by the Staff of the Sewage Works Department.

Donald H. Barraclough,

Sewage Works Manager.

TABLE 1.

Total volume of Sewage given full treatment

Month	Carbarns Works	Clyde Park Works	Coursington Works
1957		Millions of Gallons	
January	96.215	85.220	Not recorded
February	91.042	76.690	"
March	103.353	79.940	"
April	95.675	67.675	"
May	95.246	73.535	"
June	78.441	60.120	"
July	92.653	69.815	"
August	96.669	71.070	"
September	101.667	70.570	"
October	106.043	76.465	"
November	102.572	72.140	"
December	113.861	82.310	"
Total	1,173.437	885.550	
Daily average	3.215	2.426	Estimated 1.00

Note: Stormwater flows are not metered.

TABLE 2.

Average daily volumes of Sewage given Full Treatment

Month	Carbarns Works	Clyde Park Works	Coursington Works
1957		Gallons per Day	
January	3,103,000	2,749,000	Not recorded
February	3,251,000	2,739,000	"
March	3,334,000	2,579,000	"
April	3,189,000	2,256,000	"
May	3,072,000	2,372,000	"
June	2,948,000	2,004,000	"
July	2,988,000	2,216,000	"
August	3,118,000	2,352,000	"
September	3,388,000	2,352,000	"
October	3,420,000	2,466,000	"
November	3,419,000	2,414,000	"
December	3,671,000	2,655,000	"
Daily average for year.	3,215,000	2,426,000	Estimated 1.00

Note: Figures given to the nearest 1000 gallons.

TABLE 3.

Volume of Gas produced from Sludge during Digestion

Month	Carbarns Works		Clyde Park Works	
1957	Total cu/ft.	Daily Average cu/ft.	Total cu/ft.	Daily Average cu/ft.
January	434,639	14,020	441,349	14,237
February	794,762	28,384	392,988	14,035
March	373,055	12,034	500,203	16,135
April	600,269	20,009	525,078	17,502
May	890,047	28,700	586,042	18,904
June	929,826	30,994	575,260	19,175
July	690,600	22,277	476,111	15,358
August	627,507	20,242	540,818	17,445
September	507,665	16,922	498,660	16,622
October	736,894	23,770	579,320	18,688
November	604,856	20,161	630,614	21,020
December	815,664	26,311	601,187	19,393
Total	8,005,784		6,347,630	
Daily average for year		21,934		17,390

The volume of gas used for heating the digester at Clyde Park Works totalled 2,503,250 cubic feet, an average of 6,858 cubic feet per day, or 39.5% of the total gas produced.

TABLE 4.

AVERAGE ANALYSIS OF ROUTINE SAMPLES - 1957

TEST	CARBARNS			CLYDE PARK			COURSINGTON *		
	R.S.	S.S.	F.E.	R.S.	S.S.	F.E.	R.S.	S.S.	F.E.
Permanganate Value N/80 4 hours at 80 °F	21.1	19.5	7.1	21.7	14.9	5.75	167.	170.	101.
Biochemical Oxygen Demand 5 days at 20 °C	92.4	87.5	12.3	109.	69.5	7.42	212.	180.	113.
Nitrogen-Ammoniacal	12.3	14.9	15.4	8.89	14.4	11.3	99.4	109.	110.
Nitrogen-Oxidised	-	-	3.90	-	-	3.82	-	-	Nil
Solids in Suspension	109.	96.6	16.6	103.	68.5	11.6	115.	74.	162.
Chlorion	35.9	35.5	35.3	33.1	33.3	34.3	47.4	47.8	47.4
pH Value	7.0	7.1	7.1	7.4	7.1	7.1	8.3	8.4	7.7
Alkalinity (as Ca CO_3)	148.	158.	138.	135.	138.	123.	307.	338.	327.

Results expressed in parts per million (except pH value)

Legend. R.S. = Raw Sewage, S.S. = Settled Sewage, F.E. = Final Effluent

* Sampled at irregular intervals.

MISCELLANEOUS DATA

Area of the Burgh	6330.14 acres
Estimated population	70,900
Approximate yield of 1d. rate	£2,639

Meteorological (Clyde Park Works)

Month	Rainfall (ins)	Temperature F. Maximum	Temperature F. Minimum
January	4.82	55	22
February	2.93	52	23
March	2.68	63	36
April	1.46	67	30
May	2.71	74	28
June	1.63	84	40
July	3.74	79	45
August	3.41	79	47
September	2.58	74	40
October	3.20	66	37
November	1.33	54	26
December	3.12	53	23
Total	33.61	Max. 84	Min. 22

Carbarns Works

Design dry weather flow		2.0	million gallons/day
Present estimated dry weather flow		2.6	" "
Detritor in operation		2216.	hours
Grit removed by detritor		44.	cubic yards
Screenings removed		23.	" "
Duel-Fuel engine under load	No. 1.	6877.	hours
	No. 2.	753.	"
Current generated	No. 1.	316,165.	kWH
	No. 2.	47,858.	"
Current purchased		51,166.	"
Total current used		415,189.	"
Current used per million gallons treated		354.	"

Clyde Park Works

Design dry weather flow	1.5	million gallons/day
Present estimated dry weather flow	1.56	" "
Detritor in operation	3070.	hours
Grit removed by detritor	50.	cubic yards

STAFF

Chief Charge Engineer	- T. Scott
Assistant Chemist (on National Service)	- W. Templeton, A.M.Inst.S.P. A.R.S.H.
Temporary Assistant Chemist	- C. Cunningham, B.Sc.
Apprentice Chemist	- E.R. Napier
Maintenance Engineer/Foreman (Carbarns Works)	- C. Naules
Maintenance Engineer/Foreman (Clyde Park Works)	- J.F. Taylor
Attendant (Coursington Works)	- J. Felvus